



SIERRA LEONE

ANNUAL REPORT
OF THE
Department of Agriculture
FOR THE YEAR
1952

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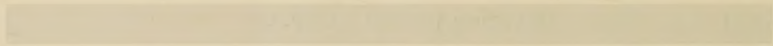
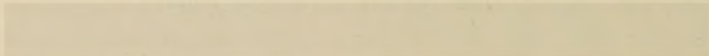
S. G. Day.

Contributions to Development

THE ANNUAL REPORT OF THE
SIERRA LEONE AGRICULTURE DEPARTMENT
FOR THE YEAR 1952



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Annual Report of the Department of Agriculture for the Year 1952

SECTION I—INTRODUCTION AND POLICY

The staff position was improved by the arrival of three new Agricultural Officers during the year. This still leaves six vacancies for Agricultural Officers under departmental and development schemes. The Agricultural Superintendents and Mechanical Superintendent appointed in 1951 have however been invaluable and, together with Agricultural Officers and African staff working at full pressure, have done very good work. Additional field officers are still urgently needed if all the agricultural requirements of the country are to be met. The field staff position is such that leave incidence may seriously affect work.

2. On the specialist side the Plant Pathologist and Agricultural Chemist were the only full-time officers. The post of Entomologist fell vacant at the beginning of the year, as also later did that of Systematic Botanist and Ecologist. The building of the Regional Rice Research Station at Rokupr proceeded apace and at the end of the year its first specialist officer, a Plant Breeder, arrived.

3. Eight Sierra Leone members of the staff were in the United Kingdom taking courses varying from one year at a Farm Institute to honours degree courses at Universities. One completed his post-graduate course at the Imperial College of Tropical Agriculture and returned to the department as an Agricultural Officer.

4. Development activities were concentrated mainly on mechanical cultivation of riverine swamps for rice during the dry season, the mass rearing and distribution of improved oil palms during the rains, experimenting with and disseminating fertilisers, and the development of livestock, particularly pigs and poultry. In the cocoa season work was concentrated upon cocoa fermentaries and instruction in fermenting. The normal distribution of seed rice and other planting material continued. Close liaison with District Councils has been maintained, several items of work being handed over to them and preliminary steps were taken for an increased devolution both of work and staff in the near future.

5. Weather conditions were mainly favourable, with the rains starting a little earlier. Abnormal rainfall in August to September caused some flooding of swamp rice but this was not serious. The overall rice crop was a record one.

6. Exports of agricultural produce were less than in 1951, being 88,076 tons valued at £6,105,178 as compared with 94,738 tons valued at £6,766,666 in 1951. Main decreases were in palm oil, ginger and piassava. Benniseed and cocoa showed welcome increases. Coffee and rice, at purely nominal export figures, by no means reflected the total production or invisible exports of these commodities.

7. The policy of the department has remained fundamentally the same as in 1950. Summarised, its aim is to secure the best use of the land, conserving the productivity and fertility of the soil, whilst developing food crops and livestock for the people and surplus crops for export. At the same time agricultural education and research into agricultural problems continue to form the background to field experimentation and extension work. Recently there has been a re-orientation in administration, extension work becoming more and more decentralised and to an increasing extent the responsibility of the District Councils. Certain mature schemes, originated and developed by the department, have already been handed over to the District Councils and, with the advice of Agricultural Officers, are working well. Experimental work is still in direct charge of the department. This devolution, together with the concentration of effort upon a few main schemes such as mechani-

sation of swamp rice cultivation, planting of improved strains of oil palm, fertilisers, livestock, pigs and poultry, is the department's current policy. Further administrative changes may be found necessary, but the cardinal policy of conserving the soil and utilizing it in the soundest possible way must remain. In detail, the present policies and methods adopted to achieve them are as follows:—

A—THE PROVISION OF ADEQUATE FOOD FOR THE PEOPLE

The most important means by which this can be achieved is by the improvement and spread of swamp rice cultivation to such an extent that not only will the needs of the people be supplied in a bad year but there will be a surplus for export in ordinary years.

(i) Mangrove Swamp Reclamation:

8. The Mangrove Loan Scheme, started by the department in 1939, has been taken over by the Bonthe and Moyamba District Councils. In Bonthe, the issue of loans has been discontinued. Land is cleared by the District Council and subsequently rented to local farmers. In Jong Chiefdom, 120 acres have been felled for this purpose. Moyamba District Council has continued the loan scheme and issued £450 to forty-five farmers during the year. An interesting development in this district was the empoldering of some saline mangrove land by two farmers near the mouth of the Kagboro creek. The District Council assisted them with a loan of £40 and the rice grown was very promising. In addition to issuing loans, the Moyamba District Council has felled thirty-five acres of mangrove by direct labour and the land will be rented to local farmers.

9. Under the old mangrove loan scheme the increase in the area felled was 163 acres, and a further thirty-three acres were felled without assistance. The total area felled since 1939, excluding what has been done by District Councils, is now 8,305 acres. The rate of felling has declined in the last few years. It appears that this is due to a shortage of skilled fellers, and the increased cost of the work. In the Bonthe area many of the younger men have left the mangrove areas to find work elsewhere. A further difficulty is the problem of weed control: Kiri-kiri grass (*Paspalum vaginatum*) is invading the cleared areas which were formerly bare of vegetation. Farmers are now faced with heavy digging before planting and, unlike the Scarcies farmers, they are finding the task uncongenial. Experiments have been designed for testing the effectiveness of hormone weed killers on this plant.

10. The Rural Area Council in the Colony area has made funds available to assist farmers in felling mangrove on the Songo Creek. Four hundred and ninety-five pounds was issued to fifty-five farmers and it is estimated that 100 acres have been cleared.

(ii) Saline Swamp Development:

11. The following table shows the progress made in the development of Saline Mangrove areas:—

TOTAL AREA EMPOLDERED IN ACRES			
Year	Scarcies	Year	Maswari
1949	10	1938	3
1950	105	1942	10
1951	335	1945	65
1952	*585	1952—Work begun on a further	ninety acres.

*Two hundred and fifty acres empoldered using a dragline excavator.

12. These areas are near the sea and, unless they are empoldered, do not have a sufficiently long salt-free period in which to grow rice. The mangrove characteristic of them is *Avicennia nitida*. Progress hitherto has been slow, since it has been necessary to study the results of the original small schemes before embarking on the larger ones. Surveys costings and crop tests on pilot schemes have now been completed, however, and sufficient experience has been acquired to enable larger schemes to be undertaken with confidence.

13. During 1952, the Irrigation and Drainage Branch of the Public Works Department empoldered 250 acres near Mapotolon, in the Scarries area, using dragline excavators. If the costs can be kept within economic limits and the work is speeded up it will be possible to take in a large area.

14. Wellington polder in the Colony has proved uneconomic and its maintenance has been discontinued.

(iii) *Inland Swamp Cultivation:*

15. Schemes designed to prove to the public that rice can be grown successfully by hand in inland swamps, using improved varieties, have succeeded in their purpose. In the Makeni Circle, particularly, farmers are developing inland swamps for themselves and it is now the accepted practice. Elsewhere progress is not so fast, but interest has been maintained, notably where the yields on upland farms have declined.

(iv) *Mechanised Cultivation of Swamps:*

16. *Mechanical Cultivation. Acres Ploughed.*

<i>Districts</i>				1949	1950	1951	1952
Bonthe	..	..	..	4	69	282	465
Rokupr	..	..	..	—	—	80	192
Port Loko	..	..	..	—	—	—	453
Pujehun	..	..	..	—	—	32	403
Moyamba	..	..	..	—	—	—	316
Makeni	..	..	..	—	—	—	238
Musaia	..	..	..	—	—	—	30
Total				4	69	394	2,097

17. In 1951, £72,000 was voted to initiate full-scale mechanised cultivation of the southern littoral grasslands of Bonthe District and the first tractors and ploughs began to arrive at the beginning of 1952. Originally it had been proposed to concentrate on the Bonthe area, but with the discovery of promising new sites in Port Loko (Kasanko), Makeni (Bantoro), Pujehun (Gbundapi) and Moyamba (Martin), it was felt that exploratory ploughing might well be started in all these areas. Drafting of machinery and new drivers had to be done gradually and a concentration in one area was not practicable. The heavy growth of grass in Bonthe District could not be cleared by mechanical means despite the use of a variety of implements, and the speed of ploughing in this area was limited largely by the speed of hand clearing. On the other sites there was no grass clearing problem, but it became evident that the soil was not as good as that of the Bonthe grasslands. Fertiliser trials at Kasanko and Bantoro showed however that superphosphate might provide the answer.

18. At all sites the reaction of the farmers was favourable and they co-operated well. Costings were kept everywhere, and a standard charge of £3 per acre for ploughing and harrowing was fixed. A target of 1,800 acres was aimed at, and 2,097 acres were actually ploughed. The 1952 rains were abnormally heavy in August to September and a certain amount of the Bonthe and Kasanko rice was flooded out. Nevertheless, some 1,800 acres produced good crops, mechanical difficulties were not excessive but river transport and bad communications in the Bonthe area caused some delay.

19. Considering that this was the first large-scale effort at mechanised farming in Sierra Leone, the 1952 season was on the whole a success and reflects great credit upon the field staff engaged and on the Mechanical Superintendent. The policy of feeling our way, evolving organisation and technique to suit circumstances as they occur, keeping costs and overheads to the minimum and aiming for the maximum acreage per tractor, is paying. It will be continued on the same lines in 1953, aiming at the cultivation of 4,000 acres. If this is achieved, if the yield is good, and if no insuperable difficulties are encountered, it will be possible to expand at a more rapid rate in succeeding years.

20. Surveys in 1952 have shown that the potential area of swamp grassland suitable for ploughing is approximately 330,000 acres, comprising 60,000 acres in the Bonthe-Pujehun area, 30,000 in Port Loko District and 240,000 in the Batkanu-Yonibana "boli" lands. A further £56,000 has been voted for mechanical rice cultivation in 1953.

21. Difficulties such as undue flooding, poor growing weather, fertility and mechanical problems, are bound to occur. Some sites may prove disappointing, others will better expectations. The economics of the whole project will need careful watching and the reactions of local farmers may vary. The prospects, however, are so good and the initial efforts have met with so much success that it will be well worth while to persist in methods which may well revolutionise rice production in Sierra Leone. It is clear that large stretches of virgin swampland exist which offer no insuperable obstacles to mechanical cultivation. It is clear also that continuous persistent effort, developing the finer points of organisation and technique year by year, should bring these areas into successful economic rice production in a comparatively short time. If all these swamps could be developed, the total production of Sierra Leone rice could be increased by at least fifty per cent. It will never be done in sufficient time by hand methods. Mechanisation offers the hand farmers an opportunity to escape from arduous subsistence farming, and their first reactions show that they will not be slow in taking it.

(v) *Swamp Seed Rice Distribution:*

22. The main source of pure seed is Rokupr Farm, which produced 703 bushels (42,180 lb.). This was used for sale to farmers, and for supplying other stations with new stock for multiplication, so that there is always a nucleus of pure seed available to farmers. Farmers were encouraged to produce seed of reasonable purity for sale to others needing it. In the Scarcies Circle 219 bushels were purchased for re-sale elsewhere, and in Bo District some 600 bushels were produced. There is a greatly increased demand for seed suitable for growing on mechanical cultivation sites, and parts of these sites are reserved by the department for fertiliser trials, and to supply future requirements of seed.

(vi) *Better Cultivation of Inland Swamps for Crops other than Rice in the Dry Season and the Development of Small Field Crops:*

23. The cultivation of sweet potatoes, cassava, groundnuts and local vegetables is now the common practice in dry season swamp farming, the Colony market gardeners and the people of Makeni town being notable exponents of this intensive cropping. Chinese yams, benniseed and pineapple on the uplands are noticeably on the increase, whilst stimulus to banana growing in specialised areas has been given by the efforts to establish a banana export trade.

(vii) *Improvement of Livestock and Poultry:*

24. *Cattle.*—The building programme at the Animal Husbandry Station at Musaia has now been completed, and it has been possible to pay greater attention to the proper work of the station and to undertake work in the field, particularly in connection with settling Fullah cattle owners.

25. *Pigs.*—Wessex Saddleback pigs have not done so well at Newton and Njala as strains of Large Whites. At Musaia, however, their performance has been very satisfactory.

26. *Small Livestock.*—Rabbits at Newton and Njala have maintained steady progress, and a number have been supplied to the Veterinary Department for the production of Rinderpest vaccine, and to the Medical Department for Laboratory use.

27. *Poultry*.—Rhode Island Red fowls were reared for distribution to local farmers for breeding purposes and though the numbers available were larger, the demand is still greater than the supply. Light Sussex crosses with Rhode Island Red have been tried. They mature rather more rapidly than the pure Rhode Island Red, but do not lay so well.

28. *Chinese Geese*.—The birds imported in 1951 have increased their numbers satisfactorily and have also done well at Musaia. The importation of further stocks is contemplated.

29. *Ducks*.—Imported ducks (Khaki Campbell and Indian Runners) proved a failure owing to their inability to breed. Attention is being concentrated on the local Muscovy breed which thrive well with the minimum attention.

30. A table showing numbers of cattle, pigs and poultry at Newton, Musaia and Njala is appended:—

NUMBERS OF LIVESTOCK AT 31ST DECEMBER.

Year		Stock	Pigs		Stock	Poultry	Cattle	Rabbits
			Sold for Breeding	Sold for Pork		Sold for Breeding		
<i>Newton</i>								
1940	..	14	—	1	227	—	—	—
1941	..	12	3	20	71	—	4	—
1942	..	83	3	36	58	2	10	—
1943	..	83	13	76	77	24	13	—
1944	..	24	9	55	137	1	20	—
1945	..	32	18	38	83	28	19	29
1946	..	62	23	27	185	29	25	21
1947	..	102	40	35	185	36	26	47
1948	..	109	17	56	152	37	23	44
1949	..	82	23	90	276	42	26	64
1950	..	91	68	77	306	77	27	81
1951	..	86	48	53	475	148	31	47
1952	..	86	61	38	589	498	32	62
<i>Musaia</i>								
1947	..	2	—	—	—	—	6	—
1948	..	—	—	—	—	—	57	—
1949	..	—	—	—	—	—	105	—
1950	..	—	—	—	—	—	119	—
1951	..	3	—	—	9	—	156	—
1952	..	27	3	—	163	7	229	—
<i>Njala</i>								
1944	..	3	—	—	284	234	31	—
1945	..	9	—	—	400	154	28	—
1946	..	37	—	—	237	70	34	47
1947	..	48	12	21	148	77	44	17
1948	..	30	21	24	244	92	46	8
1949	..	16	32	26	136	59	29	4
1950	..	33	46	3	107	*14	37	8
1951	..	28	43	12	52	*90	34	23
1952	..	15	17	26	218	55	30	56

* Heavy mortality among chicks.

B—THE CULTIVATION OF CASH CROPS AND THE EXPLOITATION OF WILD TREES FOR EXPORT PURPOSES

31. The following table gives comparative figures of Agricultural Exports in recent years:—

<i>Products</i>			1938	1949	1950	1951	1952
PALM KERNELS							
Quantity	..	..	63,697	76,541	71,269	75,102	76,375
Value	..	..	£457,031	£2,314,038	£2,277,752	£4,549,773	£4,675,914
Price	..	..	£7	£30	£32	£61	£61
PALM OIL							
Quantity	..	..	1,066	3,308	1,940	3,191	832
Value	..	..	£16,025	£186,348	£105,411	£260,844	£87,940
Price	..	..	£15	£56	£54	£81	£105
PIASSAVA							
Quantity	..	..	3,791	2,785	5,348	6,153	3,546
Value	..	..	£40,369	£118,744	£273,336	£283,010	£138,671
Price	..	..	£10	£43	£51	£46	£39
GINGER							
Quantity	..	..	2,705	1,395	2,383	3,251	1,515
Value	..	..	£60,680	£146,791	£563,535	£772,388	£169,629
Price	..	..	£22	£105	£237	£241	£111
COFFEE							
Quantity	..	..	38	257	317	1	1
Value	..	..	£793	£17,165	£39,092	£216	£217
Price	..	..	£21	£67	£123	£216	£217
COCOA							
Quantity	..	..	384	714	1,620	1,811	2,061
Value	..	..	£5,849	£65,637	£117,212	£525,974	£638,481
Price	..	..	£15	£92	£72	£290	£309
KOLA							
Quantity	..	..	1,450	1,680	1,070	1,564	1,242
Value	..	..	£29,785	£155,216	£106,244	£181,974	£181,009
Price	..	..	£20	£92	£99	£116	£145
BENNISEED							
Quantity	..	..	374	287	804	46	336
Value	..	..	£3,700	£10,728	£33,811	£3,073	£30,995
Price	..	..	£10	£37	£42	£67	£92
GROUNDNUTS							
Quantity	..	..	Nil	2,454	3,465	3,619	2,168
Value	..	..	—	£71,639	£100,011	£189,414	£182,322
Price	..	..	—	£29	£29	£52	£84
Total Tonnage							
All Exports	..	..	73,505	89,421	88,215	94,738	88,076
Total Value							
All Exports	..	..	£614,232	£3,086,296	£3,616,404	£6,766,666	£6,105,178

NOTE:—Quantities are quoted in tons. Prices are the average ruling price per ton during each year. These figures are quoted from export statistics, the actual monetary value to the producer would be two-thirds of these figures.

32. The main changes in production were decreases in palm oil, piassava, ginger and groundnuts and increases in palm kernels, cocoa and benniseed. The decrease in palm oil and groundnut exports is not due to price. In the case of palm oil a possible explanation is that 1952 was an exceptionally good rice year and that consequently more palm oil was consumed locally as an addition to the rice dish: more groundnuts are probably being consumed locally but in addition 1952 was not a good yielding year. The fall in the export of piassava and ginger was due largely to reduced prices. Benniseed, although only a secondary crop, revived after

a poor year in 1951, while cocoa shows a small but steady increase. All information shows that coffee growing is gaining in popularity and large areas in the South-east are coming into bearing. There is at least as much coffee cultivation as cocoa and the export figure of only one ton is obviously not a true index of coffee production.

33. In addition to encouraging cocoa and coffee planting the department's main effort with regard to tree crops is the country-wide improved oil-palm campaign. This started in 1948 and its growth is shown in the following table:—

OIL PALM DISTRIBUTION

Number of Seedlings Distributed:

			1948	1949	1950	1951	1952
Njala	..	..	—	2,230	6,277	4,716	16,738
S. W. C.	..	..	1,212	4,000	8,604	21,600	50,565
Rokupr	..	..	75	2,814	783	3,115	9,629
Port Loko	..	..	833	5,255	7,775	12,118	5,772
Makeni	..	..	3,630	4,455	12,053	25,675	43,396
Kenema	..	..	3,000	874	—	1,190	4,900
Colony	..	..	—	300	4,000	12,600	14,500
Bonthe	..	..	—	—	—	—	615
Total	..		8,750	19,928	39,492	81,014	146,115

34. The main oil-palm nursery is at Njala where some 160,000 seedlings of improved strains of oil palm in various stages of growth are established. A modern germinator has been built and overhead irrigation installed. Some 70,000 selected Nigerian seeds arrived from Benin and spectacular success was achieved in the germinator. Other nurseries are maintained at all stations, and by various District Councils, and by 1954 there should be at least a half million mature seedlings ready for distribution to farmers throughout the country.

35. With regard to cocoa cultivation, monkey drives continue to be confined to the Pujehun District. Here and at Kenema nearly 100,000 monkeys have been killed since 1947 when drives began. This must have had an appreciable effect in lessening the damage to cocoa pods. Four cocoa fermentaries in Kenema District and four in Pujehun District continued to operate, with the assistance of Produce Marketing Board funds, as demonstrations in good fermenting. Advice on fermenting was given to Co-operative Cocoa Societies as well as to farmers in general. Some 400 seeds of high-yielding strains of selected Amazon cocoa trees from the West African Cocoa Research Institute, Gold Coast, were received, and germinated well in the nursery at Njala. These seedlings will be planted out in the Kenema and Pujehun Districts in 1953. If they turn out as well as they are doing in the Gold Coast these seedlings and their progeny should prove invaluable to the future development of the cocoa industry in Sierra Leone.

C—SOIL CONSERVATION

36. Surveys have begun in the area north of Kabala with a view to constructing simple inexpensive dams across small streams. The object in view is to hold up water for cattle in the dry season and to extend the areas suitable for rice and pasture. A small trial dam at Musaia has shown its value and Koinadugu District Council has voted money for the construction of similar dams at suitable places in the District. If successful, it will also help to check the discharge of excess rainfall into the main streams and so even out their flow during the year. Many streams which used to be perennial now dry up after the rainy season. This process appears to be accelerating. North of the border the French are doing impressive work in establishing dams, and an Agricultural Superintendent visited French territory during the year in order to study their activities. It is clear that the whole Northern area of Sierra Leone is in urgent need of water conservation. The appointment of an experienced Hydrologist to survey the area and to put into action a co-ordinated plan, would not only

benefit local farmers and cattle owners but would assist the preservation and development of trees as well as annual crops. At present although it is not obvious to casual view the area is becoming rapidly deforested, with noticeably ill effects on local streams and other vegetation.

D—THE IMPROVEMENT IN PREPARATION, QUALITY AND MARKETING OF PRODUCE

37. Instruction has been given to producers in the proper methods of preparation of cocoa, piassava and other produce. Central fermentaries established in the cocoa areas in 1950 continued. The quality of cocoa showed improvement during the year but there is a danger that efforts to achieve thorough fermentation are leading to overfermentation. In the case of piassava it was not easy to get results, owing to a decline in the price, and to other factors which make the work of instructors a thankless task.

E—AGRICULTURAL EDUCATION

38. The training of future Agricultural Instructors continued at the Njala Training College. There were twenty-seven students in training of which ten were in their final year and seventeen in their first year, including one from the Gambia. Altogether sixty Agricultural Instructors have been drafted into the department from the Njala Training College since the Agricultural Course began in 1939. There were six prospective Agricultural teachers at the College who will eventually teach Agriculture in the schools.

39. Mr. W. C. O. Allen, an Agricultural Instructor, remained on secondment in charge of the Mabang Agricultural Academy.

40. Students taking training courses overseas for appointment to the Senior Service included S. A. Kawa, Honours Bachelor of Science, Agricultural Degree, Wye; A. R. Siaffa, Honours degree in Rural Science, Aberystwyth; C. T. Pyne, Bachelor of Science Honours, Botany, Cardiff; J. O. Belford, Ordinary degree, Leeds; H. O. Jarrett, Honours Bachelor of Science, Agriculture, Glasgow. J. A. C. Davies, who took a Bachelor of Science degree in Agriculture at Reading, completed his post-graduate training at Cambridge and at the Trinidad Imperial College of Tropical Agriculture, and was appointed Agricultural Officer. Messrs. G. B. Foday and J. P. W. Hopkins, Instructors in the department, were promoted to be Agricultural Superintendents and proceeded to Nottinghamshire Farm Institute for a year's course. Two Instructors, Messrs. M. B. Farboh and W. E. A. French, spent three months at the West African Cocoa Research Institute at Tafo in the Gold Coast.

F—RESEARCH

41. The erection of the West African Regional Rice Research Station at Rokupr progressed ahead of schedule and at the end of the year the first specialist, W. Jackson, Plant Breeder, arrived. Rice breeding experiments carried out at Rokupr in 1950 were successful and the hybrids thus obtained are being multiplied for selection. Further varieties of rice were imported and selections from existing stocks continued.

42. Preliminary discussions took place at the West African Institute for Oil-Palm Research, Benin, regarding the establishment of an oil-palm research substation in Sierra Leone, and arrangements were made for an Agronomist from W.A.I.F.O.R. to visit Sierra Leone to select a suitable site.

43. The Plant Pathologist continued his fundamental work on Sierra Leone fungi, investigating plant diseases and making further collections of phanerogamic plants. Details will be found under the appropriate section.

44. The Agricultural Chemist carried out an extensive series of fertiliser experiments throughout the country, conducted cocoa fermenting experiments and made routine analysis of soils, particularly in connection with the mechanised ploughing schemes. The results of this work are embodied in the Agricultural Chemist's report.

SECTION II—THE WORK OF THE DEPARTMENT OF AGRICULTURE

A—ORGANISATION AND STAFF

45. Organization remained substantially the same as in 1951. The post of Entomologist fell vacant early in the year on the transfer of Mr. F. A. Squire to the post of Director of Tsetse Fly Control in the Gold Coast. Mr. D. Small, Systematic Botanist and Ecologist reverted to the Forestry Department. Messrs. J. A. C. Davies and D. O. Williams, newly appointed Agricultural Officers, arrived in August, and Mr. A. K. Murray another newly appointed Agricultural Officer arrived in September. Mr. Jackson, Botanist (Plant Breeder), was newly appointed to the Rice Research Station, Rokupr, in November, and a second Mechanical Agricultural Superintendent, Mr. S. G. Day, arrived in December.

46. Promotions included Mr. P. Adames, Agricultural Officer, to Principal Agricultural Officer with retrospective effect from June, 1951, Mr. T. S. Jones, Agricultural Officer, to Senior Agricultural Officer with effect from January, 1952, Messrs. G. B. Foday and J. P. W. Hopkins, Agricultural Instructors, to Agricultural Superintendents with effect from January, 1952.

47. The incidence of leave, arranged to enable full staff to be available during the ploughing season, resulted in some circles being without residential Senior Staff for a period during the rains. During this time the Bonthe and Kenema Circles were supervised creditably by selected members of the Junior Staff.

48. As usual, the expansion of extension work kept staff at full pressure and the chronic shortage of Agricultural Officers was keenly felt. Nevertheless the main programme was carried through successfully and new developments received their full attention. Much more, however, could be done with a few more fully trained and experienced Agricultural Officers. A second Horticulturist could with advantage be appointed for Protectorate work, while the need for a trained Hydrologist and staff was evident in many places.

B—AGRICULTURAL CIRCLES

South-western Circle

Experimental Station, Njala.

49. *Upland Grasses*.—The study of exotic and local grasses for pasture and fodder purposes and as a fallow crop continued. The dwarf strains of *Panicum maximum*, especially those from Queensland and Puerto Rico, do not compete very well with weeds and indigenous grasses and intensive weeding was necessary in some cases to maintain the stands. The tufted habits of these grasses leave ample soil space for weed development. Grazing and cutting trials were continued as in previous years. Owing to the selective grazing of the animals, weed growth was higher in grazed plots than in those cut for fodder.

50. *Pennisetum setosum* ex-Gambia continued to give twenty per cent higher yield than the indigenous strain ex-Makali, but the yields were thirty per cent lower than in 1951. The reverse was the case in the grazing plots. The Makali strain gave twice as many grazing days as the Gambia strain. In July a dressing of fertiliser containing N, P, and K in the ratio 2 : 2 : 1 was applied. The Makali strain continued to remain green throughout the dry season.

Yields, Pounds/Acre			Makali Strain	Gambia
Cut. 1951	..	..	27,984	29,225
Cut. 1952	..	..	22,044	26,828
Cow/Days/Acre				
1951	..	..	228	96
1952	..	..	550	276

51. A fertiliser trial on dwarf *Panicum maximum* showed that the application of various types all increased the yield of cut fodder to from two to three times that of the control. Unfortunately the results were not satisfactory owing to the high percentage of invading indigenous grasses in the sward.

52. To test the effect of long grass leys on the fertility of the soil, a block of one acre, which had been under Guinea grass cover since 1945 and had received a dressing of fertiliser in 1950 and 1951, was ploughed up and sown with upland rice. The growth of rice was very poor and yielded only 240 lb. of paddy per acre.

53. Another two acres of grass fallow under indigenous grasses, which had carried poultry for the previous five years, were also ploughed up and sown to upland rice. One acre yielded 315 lb. paddy, and the other acre, which had received an additional treatment with 2 cwt. of superphosphate, yielded 696 lb. paddy. The reaction to superphosphate is striking.

54. *Tephrosia candida*.—In 1949 a one-acre block, which had been proved almost completely infertile after five years under a cover of *Calapogonium mucunoides*, was given a dressing of five tons farmyard manure, two hundredweight of superphosphate and four hundredweight of sulphate of potash. It was then planted with *Tephrosia candida*. At first difficulty was found in getting a good cover, and weeding was necessary. After two years, the *Tephrosia* was lopped back to four feet and the cut tops allowed to remain on the ground. The plot was invaded to some extent by *Pueraria phaseoloides*, *Calapogonium* and *Centrosema pubescens*, but by 1952 there was quite a good cover of *Tephrosia* remaining. This was cut, the old woody stems were left to dry, subsequently burnt, and the land ploughed up. It was then divided into four quarter-acre plots, a dressing of two hundredweight per acre of ammonium sulphate was applied to one quarter, superphosphate to another and sulphate of potash to a third; the fourth quarter was left without any fertiliser. The whole block was sown with upland rice.

Yields were:—

Control	600 lb./acre of grain
Nitrogen	712 " " " "
Superphosphate	916 " " " "
Potash	696 " " " "

Considering the past history of the plot the yields were fairly satisfactory. The response to superphosphate was again marked. This result is striking when compared with the results obtained after land has been under grass ley for some years.

55. *Leguminous Fodders*.—*Pueraria phaseoloides* continues to provide an excellent high protein fodder. It also makes an excellent cover crop, but it has one serious drawback; it is most difficult to eradicate when followed by other crops, owing to its self-seeding habit and as a weed it is most difficult to control. Waterloo beans and Cowpeas are proving a good substitute, although not of such good value as a cover crop. Groundnut tops also prove most valuable as a fodder crop.

56. *Annual Crops*.—Fertiliser trials were carried out on a large number of crops, and the results are recorded in the Chemist's report. Superphosphate seems to be the main deficiency, although the addition of potash gave some increases, particularly with root crops. Full dressings of NPK also proved of value. Demonstration plots were extended, especially for the benefit of visiting farmers. All the crops grown on the farm were demonstrated with all combinations of fertiliser treatments. Over three hundred farmers visited Njala to inspect this demonstration and were impressed with the results. Many applied for a supply of fertilisers for their own use.

57. An observation trial was carried out to see what differences there might be between deep and shallow cultivation, and early (dry season) and late (just before planting) cultivation for groundnuts. Yields were good, averaging 2,494 lb. uncorticated nuts per acre, but there was no significant difference in the results of any of the treatments. The intercropping of young citrus orchards was also initiated, and crops of groundnuts and cassava were grown in strips between the rows of citrus; the other ground between the trees along the strips was planted with pineapples, thus making maximum use of the ground. So far there is no indication that the citrus

has been affected, rather it is probable that inter-row cultivation may be beneficial. Other trials with groundnuts showed that superphosphate gave much increased yields but the application of Gypsum or lime had no effect.

58. *Permanent Crops*.—Routine recording of yields of tree crops such as citrus, coffee, oil palm and kola was continued. Fertiliser trials were also laid down on these crops but complete data from which to draw conclusions are not yet available. Radial manuring of kola with 4 lb. per tree of superphosphate gave immediate results. These began to flower profusely and the yield of pods at the first harvesting was 549, an increase of 539 on the previous year and 475 on the 1950 yield. The highest yielding tree gave 177 pods.

59. *Oil Palm*.—Attention was paid to the oil palm plantation, especially in the selection and propagation of high yielding strains. A new germinating house was completed and put into operation, the initial results far exceeding expectations. The first setting of seed was one of 70,000 sent from Benin, Nigeria. In five days the seeds had germinated and planting out was started on the 21st day after placing them in the germinator. Germination was sixty per cent (some are still germinating) and survival rate after transplanting was ninety-eight per cent. Had the seed been further selected for size the germination percentage would have been much higher. Seedlings raised by this new method are, after three months' growth, as big as, and healthier looking than, those of twelve to fifteen months growth under natural conditions.

60. An overhead irrigation system has also been installed in the oil palm nurseries to assist in maintaining this vigorous growth. During the year a total of 16,738 oil palm seedlings and approximately 20,000 economic trees and ornamental plants were distributed.

61. *Livestock—Cattle*.—The health and general condition of the herd remained good throughout the year. The average weight of new born calves was 36.3 lb. as against 32.7 lb. for the previous five years. Three heifers died suddenly after grazing on upland rice stubble. An examination by the Veterinary Department suggested oxalic acid poisoning. Samples of stubble were sent to the Colonial Plant Product Advisory Bureau in the United Kingdom and analysis of the sample showed they contained one per cent oxalic acid. Local farmers have also reported deaths of cattle after grazing similar stubble.

62. *Pigs*.—The herd kept at Njala was rather a mixed lot of Large Whites, Wessex Saddlebacks and Berkshires, and had been interbred. A policy of pure breeding, and first crosses only, was initiated and the herd was culled heavily. This reduced the herd considerably but beneficially. Seventeen pigs were sold for breeding purposes to local farmers. Twenty-six were sold for slaughter and sixteen were culled soon after birth. There were only four deaths. In August the herd was given antrycide injections as a prevention against trypanosomiasis. Fifteen animals were retained for breeding and, when new piggeries are erected next year, the herd will be increased to a larger and more economic unit.

63. *Poultry*.—The health of the poultry improved during the year. The inclusion of fish meal (dry bonga) cut down the chick mortality but it still remains at an unsatisfactory level; new stock is required. Gape worms and coccidiosis were also prevalent in young birds.

64. Egg production was 2,228 of which 1,180 were incubated and 579 sold to applicants for hatching. The local strain of Muscovy duck continued to do well but the Indian Runners and Khaki Campbells did not. They were sent to Musaia Station in the hope that conditions there might be better.

65. Rabbits have flourished and are easy to keep. Rearing is not difficult though some deaths amongst the very young occur. Most surplus stock were sent to the Veterinary Department for the production of lapinised rinderpest vaccine.

Extension Work:

66. *Inland Swamp Development.*—Weather conditions being very favourable for upland farming, there was a decrease in the area of swamp land cultivated in Pujehun District. Nevertheless, in Bo and Moyamba Districts, interest was maintained and it is estimated that a further 764 acres of inland swamps were brought into cultivation.

67. *Mechanical Cultivation.*—Following the successful cultivation of thirty-two acres of riverain swamp in 1951, operations were extended in 1952 to two other sites.

<i>Site</i>				<i>Acres Ploughed</i>	
				1951	1952
Pujehun, Gbundapi	..	..	..	32	403
Moyamba, Martin	..	..	..	—	316
Total	..	..	..	32	719

The ground was ploughed and harrowed once before being allocated to farmers in blocks of five to twenty acres each. Owing to unusually heavy rain in August, some of the rice at Gbundapi was lost through strong currents in the flood water. Yields on the remainder, particularly at Martin, were good.

68. *Mangrove Clearance Scheme.*—The extension of cleared areas on the Bumpe and Ribbi Creeks continued, and in all eighty-eight acres were cleared. The Moyamba District Council has taken over the administration of the scheme, and issued £450 to forty-five farmers. They also issued £40 to two farmers for empoldering a saline mangrove area. The work was successfully carried out and satisfactory rice crops were grown.

69. *Seed Rice Production.*—In Bo District one Native Administration issued £80 in loans to selected farmers for the production of seed rice. In all some 600 bushels of seed were grown for sale to local farmers.

70. *Cocoa.*—Increased interest in the crop was shown in all districts. A survey of existing and new plantations gave the following results:—

<i>District</i>				<i>Acreage</i>		<i>Current Increase</i>	
				1950	1951	1952	
Pujehun	..	..	..	2,533	2,883	3,303	420
Bo	..	..	..	1,002	1,335	2,006	671
Moyamba	..	..	..	—	54	71	17
Total	..	..	..	3,535	4,272	5,380	1,108

71. There was a marked improvement in the quality of cocoa sold. The quantity of Grade I produced was considerable and there was an encouraging decrease in the quantity of Grade IV.

72. Central cocoa fermentaries were continued and, as in 1951, the price paid for wet beans was 5½d. per lb. Their output is shown in the table below.

				<i>Lb. wet</i>				
<i>Year</i>				<i>Beans bought</i>	<i>Lb. Grade I</i>	<i>Lb. Grade II</i>	<i>Lb. Grade III</i>	<i>Lb. Grade IV</i>
1950	..	..	..	38,582	14,609	141	—	29
1951	..	..	..	26,426	8,766	—	—	—
1952	..	..	..	17,400	8,400	2,240	—	—

The decrease in the amount of wet beans purchased was due to the setting up of co-operative fermentaries and to farmers having learned to ferment their own cocoa. The fermentaries having served their purpose in demonstrating fermenting will be reduced in number and kept for research into fermentation processes.

73. Monkey drives were organised in Bo and Pujehun Districts and 9,607 monkeys were destroyed.

74. *Oil Palms*.—The output from oil palm nurseries was increased, and a substantial number of seedlings was distributed.

				<i>Seedlings in Nurseries</i>	<i>Seedlings Distributed</i>
1949	..	..	..	10,000	4,000
1950	..	..	..	21,000	8,604
1951	..	..	..	140,800	21,600
1952	..	..	..	123,000	50,565
Total				..	84,769

Check counts have shown that the establishment rate is in the region of sixty per cent. Most of the failures are due to rodents, in particular the "Cutting Grass" (*Thryonomys swinderianus*). A Cutting Grass drive was organised in Moyamba District, but the results were difficult to assess. The animal is a culinary delicacy, and participants in the operation were reluctant to bring forward their captures.

75. *Piassava*.—Production was good in the early part of the year, but it declined when a proposal was made to withdraw the concession whereby traders were permitted to possess material containing 12½ per cent of impurity instead of five per cent. Traders were not in favour of the proposal.

76. In order to assist both traders and producers, inspection centres were set up where producers could bring their piassava for inspection before sale, and where faults and their correction could be demonstrated.

77. *Coffee*.—Rising prices for this crop maintained the interest shown by farmers last year, and a considerable area of new plantations has been made. Other things being equal, farmers prefer coffee to cocoa, since it is much more easily prepared for market and there is at present no price differentiation for quality.

78. Pujehun and Bo District Councils have issued loans amounting to £800 to farmers for the establishment of new coffee plantations.

79. A census of coffee plantations gave the following figures:—

<i>District</i>				<i>Acreage</i>		<i>Current Increase</i>	
				1950	1951	1952	
Pujehun	..	..	..	1,998	2,268	3,146	1,148
Bo	..	..	..	640	641	2,115	1,475
Moyamba	..	..	..	No census	282	437	155
Total	..	..	..	2,638	3,191	5,968	2,778

80. *Ginger*.—The quantity available was in excess of the demand, but in spite of this, and a sharp drop in price, the acreage was maintained, since farmers were hoping for a recovery in the price. Much of the ginger has not been harvested, and this will lead to a decline in quality should there be an increased demand at some future date.

81. *Soil Conservation*.—The department co-operated with the Forestry Department in carrying out early burning of grassfields in Moyamba District.

82. *Fertilisers*.—Experiments on ginger, rice, cocoa and oil palms were continued. Farmers are becoming interested in the use of fertilisers on their crops, particularly where quick and visible responses result, as in the case of rice.

SCARCIES CIRCLE

83. *Rice Research Station, Rokupr*.—Constructional work on the new buildings progressed much more rapidly than in the previous year, and a good many staff quarters were completed. The laboratory building was almost completed by the end of the year, but the major work of equipping the building is still to be done. Recruitment of staff showed some improvement, a Botanist (Plant Breeder) arrived late in the year and one Chemist is expected early next year.

84. *Rice Selection*.—Work on selection and multiplication of rice suitable for conditions in Sierra Leone continued. Fifty-eight new varieties were received from nine different territories. There are now one hundred and ninety-five imported rice varieties in the station collection, most of them still under observation. Others are maintained for future work. One hundred and seventeen pure line selections of local and imported swamp varieties and a collection of twenty-nine upland rices were also under observation for yield and other characters. Work on hybridization continued and nearly seven hundred crosses were done. It is hoped to produce varieties with more suitable characteristics for conditions in West Africa. There has been a big demand for seed rice from Nigeria and the Gambia; and eight other territories, in Africa, Asia and Australasia, were sent small quantities of pure seed rice for trial. A small experiment was started to discover, if possible, the percentage of natural cross pollination which takes place in this country. Results are not yet available. It also was decided to try to maintain pure lines by bagging the flowering heads and leaving them bagged until harvest. This would prevent any possibility of natural cross pollination.

85. Two yield trials were carried out to compare imported or selected strains, against Lead used as a control. Although there was little significant difference due to soil variation, two strains, Afaa Mwanza and 2/16 from Tanganyika, are promising.

86. A trial was also carried through on six selected strains of Indo-China rice. There were no great differences in yield, but conditions at Rokupr are not comparable with the deeply flooded areas, with water up to fifteen feet deep, in which this rice succeeds in growing. Work elsewhere indicates that depth of water, rate of flooding, and strength of current, are important.

87. Seven hundred and three bushels of seed rice of selected varieties were grown for distribution in Sierra Leone.

88. *Water Control*.—The major part of the farm was maintained under tidal conditions throughout the year. Four blocks of half an acre each, which had been under control for various periods, were again restored to full tidal influence. The history of the yields of these blocks is of interest. Yields are given in lb. paddy.

Year				Block No.			
				10	11	13	14
1935-43	..	..	..	1,550	1,330	1,810	1,570
1944	Water Control instituted	..	..	3,190	2,280	2,740	2,170
1945	Water controlled	..	..	2,100	1,460	2,300	440
1946	..	..	..	1,770	1,310	2,550	210
1947	..	..	..	1,020	170	2,000	—
1948	..	..	..	504	290	1,290	10
1949	Tidal conditions restored	..	..	2,030	1,440	2,630	1,640
1950	Water control reinstituted	..	..	1,740	1,220	2,680	2,670
1951	Water controlled	..	..	970	580	950	1,000
1952	Tidal conditions restored	..	..	2,650	2,370	2,540	2,480

It appears that when full control by empoldering is established, toxic conditions appear in the second year, and that these conditions can be corrected in the first year that full tidal action is restored. A strange feature is that in some blocks alternating water control with no control appears to give a temporary, but very marked increase in yield, this characteristic being very marked in the 1944 results.

89. A small modified trial on water control shows that to deny tidal action throughout the year maintains the toxic conditions, although after seven years there might be some slight improvement. This requires further investigation.

90. Low bunds which do not prevent tidal action, but retain water after high tides, appear beneficial, probably due to increased silt deposition within the bunds.

91. Fertiliser trials were carried out mainly on the fertile land near the banks of the river. There was no appreciable difference in yield if superphosphate was applied at the time of planting, nor from a dressing of superphosphate or Sulphate of Amonia eight weeks after planting. There was no significant difference between superphosphate, silico phosphate, Lime or Gypsum.

92. *Other Crops*.—Improved varieties of sweet potatoes and cassava were grown for distribution, and 13,629 seedlings of improved varieties of oil palm were distributed during the year, of which 4,000 were sent to Makeni Circle.

93. *Livestock*.—The small herd of Ndama cattle kept in good health throughout the year. Six bull calves and two heifer calves were born, one died of suspected poisoning and one was culled. The herd numbers thirty.

EXTENSION WORK

94. *Swamp Clearance Schemes*.—Good progress was made with clearance schemes in the mangrove areas. The bunds on the Bambaia polder of 130 acres were completed, but no permanent sluices have yet been installed. The Bakepet polder of 205 acres, completed in 1951, has not yet had permanent sluices installed, but the temporary wooden ones functioned satisfactorily and good crops of rice were grown. At Mapotolon, the Drainage Branch of the Public Works Department started work on a large polder of 500 acres, using mechanical excavators. The bunds were completed on one section of 250 acres but the sluices were not completed before the rains set in.

95. The Luti and Rosino reclamation schemes showed improvement after the new drainage channels were cut, and promising crops were grown on areas which were unproductive in past years.

96. Inland swamp clearance schemes show steady progress. At Maligi in Tonko Limba Chiefdom, the twenty-three acres cleared were all cropped; at Mintomo, forty acres were cropped as against thirteen in 1951, and crops were good. Preliminary work was undertaken on clearing a tributary of the Maseba creek to facilitate the drainage of an area of inland swamp for rice production.

97. *Mechanical Cultivation*.—At Mange, in Bure Makonte Chiefdom, 133 acres were ploughed and harrowed compared with eighty acres in the previous year. A small drainage channel was made to assist drying out the low-lying areas, and worked satisfactorily. All the land was planted and yields were good. Fifty-five acres were ploughed at Mapotolon, on the grassland area behind the saline swamp, but the late planting of this area resulted in weed growth. Preliminary surveys were carried out in the extensive "boli" lands in the Northern chiefdoms. Here there are distinct possibilities for mechanisation, but access is difficult at the moment.

98. *Oil Palms*.—Nine thousands six hundred and twenty-nine oil palm seedlings were distributed to farmers for planting during the year as compared with 3,115 in 1951. The survival rate was very low, being thirty per cent at the end of the year. Interest in this work is not very keen as yet, but it is hoped there will be an improvement in the future. The new pioneer oil mill erected at Mange was not well patronised in its first season of operation; this was due mainly to the conservative attitude of the farmers.

99. *Seed Multiplication*.—Rokupr continued to supply good seed of high yielding varieties of rices for distribution. In all 703 bushels were sold and an additional 219½ were purchased from farmers who had grown pure seed, for resale to those requiring improved varieties.

100. *Fertilisers*.—Several small observation trials were undertaken at various places in the circle. On swamp rice, the use of superphosphate at a maximum of 2 cwt. per acre gave very satisfactory increases in yield, which were visible to the eye before harvest. Farmers took a great deal of interest and some will probably wish to buy fertiliser for their own farms next year. Other trials were done on pineapples and bananas, particularly the latter, as there is a growing export trade for them. The results so far show a definite improvement in growth following the application of a mixture of one part sulphate of ammonia, one part superphosphate and two parts sulphate of potash at 2 cwt. per acre. Results on fruit yield are not yet available.

101. *Livestock*.—Two piggeries were started by local people, during the year, with stock from the Newton herd. Advice and assistance were given, and they have made good progress. The Paramount Chief at Mange Bureh purchased a cream separator from the department and started a dairy business which is flourishing and expanding rapidly. In Gbinle Chieftdom preliminary work was done towards the establishment of a co-operative dairy business amongst the local farmers. Ox-ploughing with Ransomes "Victory" ploughs was started successfully in Kukuna and there is keen local interest in the work.

PORT LOKO CIRCLE

102. This new Agricultural Circle originally formed part of the Scarcies Circle. As the work in this area increased considerably, particularly as the result of mechanisation, it was decided that this circle could be better supervised by an officer posted to Port Loko, working as a separate unit.

103. The main work during the year consisted of tractor ploughing for swamp rice, co-operation with the District Councils in Mangrove Clearance Schemes, Oil Palm Planting, the establishment of a piggery and mechanical cultivation for groundnuts in Lophira Bush areas. Several fertiliser trials on swamp rice and cassava were also begun.

104. *Mechanical Cultivation—Swamp Rice*.—In late January a tractor, a plough, and a disc harrow were sent to the Circle and ploughing was begun in a large swamp near the village of Kasanko. Later, another tractor and plough arrived, and for a short time a third was loaned from Rokupr. A total of 453 acres were ploughed and harrowed. All the land was allocated to farmers, who planted up the whole area except for about five acres.

105. The land ploughed was of two types, one type, being covered with thatch grass and flooding during the wet season to a depth of about twelve inches, the other covered with a matted vegetation of sedge and short grass, flooding to a depth of six feet or more.

106. In the deeper flooded areas much of the rice was washed out, while in the shallow areas the soil proved to be too poor for the rice to grow. However the experiment has provided a great deal of information. Failure in the deep flooded areas was due in part to lateness of planting, which in turn was due to the fact that these deeper areas were tackled last of all.

107. Failure in the shallow areas was due mainly to lack of nutrients in the soil. Fertiliser experiments on the area indicated that this soil suffers from acute deficiency of phosphate. These experiments are described below, and show that there is every reason to expect that good crops of rice will be obtained from this type of swamp with an economic dressing of superphosphates.

108. The Maforki Native Administration are responsible for collecting the ploughing fees, but for the 1953 season arrangements have been made for the District Council to pay a lump sum to the department for work done. The District Council will then arrange collection of ploughing fees direct from the farmers.

109. *Mechanical Cultivation for Groundnuts*.—During the year the groundnut farm originally established in a Lophira bush area by Paramount Chief Alikali Modu III was enlarged to seven acres. This area was stumped by the Paramount Chief and

ploughed by tractor. Planting was carried out by chiefdom farmers. The Paramount Chief reported yields of up to 1,400 lb. unshelled nuts per acre, but sample plots and a departmental trial gave very much lower yields. However, during the year a total of fifty acres of *Lophira* on the same site were cleared. Of this, twenty acres were stumped by hand at a cost of £5 per acre. The remainder was stumped by a tractor fitted with a winch at a cost of 55s. per acre. This area will be ploughed by tractor and planted up with groundnuts during 1953. A well was dug, which gave good water in the dry season at 18 feet. If this experiment succeeds some 100 sq. miles of waste *Lophira* land could become groundnut producing.

110. *Fertiliser Trials*.—Superphosphate trials on swamp rice were carried out on the higher lying areas at Kasanko, on tidal land at Gbainty Wala and in an inland swamp at Tolomosso (Kafu Bullon). Very large increases in yield were obtained at Kasanko, the control plots yielding only 60–120 lb. paddy per acre whereas some treated plots gave yields up to 1,560 lb. per acre.

111. Yields on good tidal swamp at Gbainty Wala were increased by as much as forty-eight per cent by the addition of superphosphate, while on poor tidal swamp in the same area, increases of as much as 157 per cent were obtained.

112. Variety trials at Kasanko indicated that for the shallow flooded areas Toma 112 was considerably superior to either Indo-China or Bolo 108, the latter being second to Toma in performance. Yields of 1,320 lb. per acre of Toma 112 were obtained on plots treated with superphosphate at 2 cwt./acre.

113. *District Council Matters*.—During the year progress was made with the policy of handing over a good deal of work originally carried out by the department to the Port Loko District Council.

114. In September, 1952, the District Council took over all oil-palm development work and formulated a plan for encouraging increased planting. Two established nurseries at Port Loko and Mahera were taken over and enlarged, and a third was established at Rosint, Buya Romendi Chiefdom. The number of palms distributed during the year was 5,772 compared with 12,118 in 1951.

115. At present there are 35,000 seedlings in the nurseries, but only about 4,300 will be sufficiently well grown for planting out during 1953.

116. The District Council agreed to adopt a bonus system for farmers who plant and rear palms successfully. This system will come into operation in 1953.

117. A District Council Piggery was established during the year at Rosint. The purpose of the piggery was to provide a source of breeding stock for farmers around the industrial area of Marampa, where the demand for meat is very great. An in-pig gilt and a boar were purchased in November, the gilt having since produced a litter of nine. If it proves a success the piggery will be enlarged and run on business lines.

118. The Mangrove Clearance Scheme inaugurated by the Kafu Bullon Native Administration at Rowal was taken over by the District Council in June. A further fifteen acres were felled at Rowal, bringing the total to ninety-one. Ten acres were felled at Yaliba (also in Kafu Bullon), where an effort is being made to persuade farmers to work mangrove swamp. The cost of felling twenty-five acres by District Council was £80 or £3 4s. 0d. per acre.

SOUTH-EASTERN CIRCLE

Experimental Farm, Kenema

119. *Annual Crops*.—Work on the maintenance of fertility in an inland swamp continued. It is clear that the use of superphosphate as a fertiliser on rice has a very marked effect in maintaining yields. It also has a definite and economic residual effect in the second year after application. The trials with fertilisers on cassava were inconclusive this year although nitrogen produced some significant increases in yield, contrary to previous experience.

120. *Perennial Crops*.—The established oil palms are doing well and provide seed for the nurseries for distribution to farmers. Nurseries were maintained and some 20,000 seedlings will be available in 1953.

121. *Livestock—Cattle*.—The Ndama herd maintained satisfactory health throughout the year. The bull brought in last year proved unsatisfactory and was exchanged for another in September.

122. *Pigs*.—The Large White pigs re-introduced last year have done well despite the death of another gilt from trypanosomiasis. Inoculation at more frequent intervals with antrycide was instituted, and it is hoped that no further losses will occur. Worms still proved troublesome, but were amenable to treatment. Satisfactory live-weight gains were made despite difficulties with foodstuffs at one period of the year.

EXTENSION WORK

123. *Swamp Clearance Schemes*.—The whole of Giema swamp was again cultivated. Plot holders purchased a ton of superphosphate for use on their own plots, and good crops were obtained. There was an overall increase in the area of swamp farms in the circle this year, despite good burns on the uplands.

124. *Cocoa*.—Planting of new farms continued, but on a smaller scale than in 1951. Kenema District Council made a few loans to farmers to cover planting expenses. This was a trial to see whether the system would work satisfactorily. A small monkey drive was organised in Kailahun. Farmers responded well to propaganda and advice on plantation hygiene, and it was noticeable that there was a marked decrease in the number of pods left on the trees, particularly those infected with "Black Pod."

125. Instruction and propaganda on fermentation continued and a considerable improvement was noticeable in the quality of cocoa offered for sale by farmers. This was also borne out by the quality of exhibits sent to the Kenema Agricultural Show. The danger of overfermenting, however, must be guarded against. There was a decrease in the amount of cocoa produced by the departmental fermentaries.

Season				Total Wet Season Bought
1950-51	..	..	..	11,448 lb.
1951-52	..	..	..	51,164 "
1952-53	..	..	..	30,253 "

This was due to the increased activities of the Co-operative Societies in surrounding villages and to certain farmers, particularly those with large cocoa farms, undertaking their own fermentation since they discovered that they can with care produce top grade cocoa themselves. It is the intention to hand over fermentaries, with the exception of one for experimental work, to the Co-operative Societies as soon as possible.

126. *Oil Palms*.—The main work has been the expansion of the nurseries required in all three districts of Kenema, Kono and Kailahun. There were very few seedlings available for planting and only 2,300 were distributed in Kenema and 2,600 in Kono but the nurseries have done well and 22,000 seedlings should be available in Kenema, 16,000 in Kono and 12,000 in Kailahun in 1953-54.

127. The main problem in Kono area is the control of the "Cutting Grass" (*Thryonomys swinderanus*) which is plentiful in the grassland areas. Every endeavour is being made to interest farmers in inter-cropping young plantations, as this is beneficial to the palms, and also reduces considerably the cost of maintaining the palms in the first few years.

128. Baoma oil mill worked well during the year and Agricultural staff gave assistance in organising the fruit supplies. Two new mills were erected in the circle and should be working in 1953.

129. *Agricultural Shows*.—A successful show was held at Kenema for the fourth year in succession. The standard of entry of exhibits showed definite improvement, particularly cocoa. A show was also held at Kailahun after an interval of twenty-five years.

130. *Coffee*.—There has been a keen interest in this crop during the year and a considerable amount of new planting has taken place. This is due to the high prices offered for the crop, which is popular with farmers because it takes less time and trouble to prepare for market than cocoa and the plantations need little attention. There has also been a considerable trade to French Guinea and Liberia at prices much higher than were offered locally.

BONTHE CIRCLE EXTENSION WORK

131. *Mangrove Swamp Reclamation*.—For the first time since 1939, when the scheme started, no loans were given for mangrove clearing. This work is being taken over by the District Council who, during the year, organised and paid a team of fellers to clear large areas at various places which will then be rented to farmers. A start was made at Mandu, in Jong Chiefdom, and 120 acres were felled by December, when the felling team moved to Bendu Chiefdom. In addition, assisted farmers felled seventy-five acres. The area cultivated by assisted farmers was about the same in the previous year and that cultivated by unassisted farmers was less. Progress was very good in Jong Chiefdom, but in Imperi and Bendu less work was done than usual. Investigations indicated that this was because a considerable number of the younger men left these chiefdoms to take up work elsewhere, while a good many of the old established farmers died. Kire-kire grass (*Paspalum vaginatum*) continued to extend and proved very troublesome. Generally the trend appears to be towards fewer but larger farms run by the keener of the farmers. The greater part of the area under cultivation consisted of well-established farms and yields were good—from 1,200 to 1,500 lb. paddy per acre.

132. During the year a total of £164 11s. 10d. was collected in repayment of loans. At the end of the year £312 3s. 7d. was still outstanding. Now that loans have been discontinued it is interesting to note that from 1939 to 1951 731 farmers received loans totalling £3,165 10s. 0d. Of this, £2,291 13s. 4d. had been recovered, £312 3s. 7d. was outstanding on 31st December, 1952 and £629 13s. 4d. is yet to fall due in 1953 to 1956. A total of £69 15s. 3d. has been written off for various reasons.

133. *Mechanical Cultivation on the Riverain Grasslands*.—The erection of mechanical workshop and a rest house for the Mechanical Superintendent was started at Solon. This year seven tractors were available in the district although one did little work owing to a breakdown and two arrived late in the season. Progress since the start of the scheme is as follows:—

Year	Acreage Ploughed			Notes
1949	4			Trial with an Anzani Horticultural tractor.
1950	69			Half-track Fordson
1951	282			Full-track „
1952	465			Full-track „

The types of tractor available were one Fowler on full-tracks and six Fordson County tracklayers with T.V.O. or Perkins diesel engines. Ransomes Dagoon and Massey-Harris disc ploughs were available, also Ransomes Countess disc harrows and two Wilder Pitch Pole harrows. Due to debris and the nature of the ground on all sites only three discs were used instead of four. Ploughing was divided between eight sites and a total of 465 acres were ploughed and 318 acres harrowed. The abnormal rains in August caused excessive flooding and wash, and one quarter of the area cultivated was destroyed. Yields on the remainder were very good, averaging between 1,500 to 1,800 lb. of paddy per acre.

134. The clearing of sufficient land continued to be a problem. Trials with Bamford mowers and heavy chains were not successful, as the grass (*Vossia sp.*) and the mat beneath it were too heavy. Hand-clearing by contract continued. Some previously ploughed areas had to be cleared a second time, due to heavy weed growth. Heavy discs may be able to deal with this in future. A tractor rake was used but was not sufficiently strong to clear the heavy grass stalks left after burning. If time is available a second burning is the best method. Wild rice (*Oryza barthii*) was the most prevalent weed but was controlled by deep ploughing to a depth of ten to twelve inches. The problem of nut grass (*Cyperus rotundus*) which gives rise to concern in some places may not be as serious as thought, for although it competes with rice in its earlier stages it dies off when flooding occurs. Deep ploughing and discing just before planting appear to control it, as its corms are quickly killed by the sun, but a rotavator and heavier discs may be more effective.

135. Costs, including fuel, wages, and clearing, but excluding movement of tractors on pontoons, depreciation, etc., were very variable, being less on the large sites than on the smaller ones. Costs at Subu on 184 acres were £1 15s. 10d. per acre for ploughing and 6s. 6d. per acre for harrowing. On other sites ploughing cost £1 3s. 6d. per acre, £2 1s. 5d. per acre and £2 13s. 2d. per acre respectively. Delays due to the bogging of tractors accounted for these rather high costs.

136. Variety trial plots were grown at Subu for the third year. Indo-China No. 53 has shown up the best, yielding 2,458 lb. paddy per acre in 1950, 1,830 in 1951 and 1,856 in 1952. Flooding and washing were very bad in 1952, and this variety was the only one which stood up to the conditions and gave more than 800 lb. per acre on a rather exposed set of plots. A small trial indicated that a seed rate of about 60 lb. per acre was best for these areas.

137. *Swamp Seed Rice Distribution*.—There was no shortage of seed rice. Ninety-three and a-half bushels were sold to farmers in April. Distribution in recent years is as follows:—

Year	..	..	..	1948	1949	1950	1951	1952
Quantity in bushels	..	..	..	38½	70	75	86	93½

138. *Piassava*.—Propaganda continued but met with little response in face of the high price of palm kernels. A small piassava experimental station was established at Solon. The site at Solon is also used as a mechanical cultivation headquarters. A long-term experiment was started on rotational cutting of raphia palms, which will also give details of the yield and cost of production of piassava, about which little is known.

139. *Oil Palm Planting*.—Six hundred and fifteen seedlings were distributed to farmers in 1952, bringing the total distributed since 1949 up to 3,249. Survival rate is about fifty-two per cent to date.

140. *Coffee*.—There was a good crop in 1952 and the high price offered resulted in the whole of it being harvested, old plantations were cleared and several new plantations were laid down.

141. *District Council*.—The department assisted the Council in the various schemes such as mangrove felling, monkey drive, creek clearing, etc.

142. *Fertilisers*.—A further experiment on the effect of fertilisers on cassava was begun during the year. Results will not be available until the crop is harvested in 1953.

MAKENI CIRCLE

143. *Experimental Farm, Makeni*.—The multiplication of improved rice varieties continued in the swamp plots. A total yield of 9,189 lb. of paddy was obtained, which averaged 1,534 lb. per acre. This is most satisfactory, considering that the swamp has been worked continuously since 1941. The results since then are indicated in the following table:—

Yields per annum in lb./acre—average

1941	..	..	..	1,500 lb.	1947	..	..	1,920 lb.
1942	..	..	..	1,200 „	1948	..	..	1,585 „
1943	..	..	..	1,080 „	1949	..	..	1,726 „
1944	..	..	..	990 „	1950	..	..	1,506 „
1945	..	..	..	1,845 „	1951	..	..	1,460 „
1946	..	..	..	1,260 „	1952	..	..	1,534 „

The varieties grown in 1952 were Sughandi, Ngasein, Panianala, Indo-China, D. 114, No. 79 and D.C. 39. Ngasein gave the highest yield, but as usual Sughandi maintained a good average. All varieties yielded well, although D.C. 39 showed the most variation and recorded the lowest yields.

144. Dry season cultivation of various crops continued. Sweet potatoes were once again disappointing, but cocoa-yams and cassava did reasonably well. Vegetables grown in the nursery area swamp plots did well in the dry season.

145. The upland orchard continues to be a very impressive demonstration of the best use of degraded upland. All the tree crops are now in bearing, except the kola, and the coffee in particular gives consistently good yields under light, airy shade. The remainder of the upland is under pasture regeneration. Fertiliser demonstration block was laid down during the wet season, but unfortunately was more or less a failure. It established beyond doubt, and in confirmation of previous opinion, that the limiting factor on this degraded upland area is lack of humus. Only plots manured either with compost or farmyard manure gave any worthwhile crop.

146. Five varieties of tobacco were planted during the year; of these Jamaican Hybrid and Western Heavy were selected as the best and are being nursed for the 1953 crops.

147. By the end of the year the last oil-palm seedlings were removed to the District Council nursery at Makama. The complete programme of rearing and distributing oil-palm seedlings has thus been finally handed over to District Councils.

EXTENSION WORK

148. The Pendembu swamp scheme was the only one which functioned well throughout the year and yields as high as 1,900 to 2,000 lb. of paddy per acre were recorded from the plots of the best farmers. At both Kamakwie and Kotohun the interest of the farmers is waning, although good yields are reported from both swamps from 1,300 to 1,600 lb. per acre. The Yele scheme, normally one of the better ones, had a bad year. This was due to late planting, the result of the local farmers' interest in groundnut farming during 1952. It is not likely that this will recur in 1953. The Binkolo scheme is not a success due to the farmers' and the Native Administration authorities' lack of interest. The Masingbe and Mamansu schemes were both fallowed during 1952. The Makali scheme was farmed, somewhat reluctantly, by the people of the town. New schemes were started at Mayatta, Mabando and Rokipit, all on a small scale, with promising results.

149. The general opinion of farmers throughout the area is that the swamp schemes have served their initial purpose and stimulated interest in swamp farming. Now individuals wish to farm their own swamps. Future policy for the circle has been directed to meet this change, and a swamp clearance bonus scheme has been

evolved to encourage individual initiative. Certain schemes will be retained, where necessary, in order to allow "strangers" to farm, e.g., at Kamakwie; but most schemes will be modified to suit the needs of the locality: e.g., at Binkolo the scheme will be closed down and the land handed over to progressive farmers to farm on their own account. Swamp farming generally continues to increase yearly throughout the circle, and methods of cultivation and varieties of rice used are all showing signs of improvement.

150. The model smallholder at Kamakwie continues to do well. This year he has made a net profit of £54 from the two acres of swamp and two acres of upland that make up his holding. He has replaced the original house with one of mud block and is extremely pleased with his lot. He wishes to extend his holding, taking in more swamp and upland, and to farm them in a similar way to the present holding. Steps will be taken in 1953 to enable him to do so, as he is an excellent example to his fellow farmers.

151. The Mabile Valley Cattle Ploughing Scheme showed a marked improvement by the end of 1952. Although the total number of plough farmers fell from seventy-eight to seventy-four for natural reasons—death, etc.—the actual number of farmers using their own ploughs and oxen rose from twenty-two at the beginning of the year to fifty-one at the end of the year. Of those who possess teams and ploughs only four were not using them as against eleven at the beginning of the year.

152. *Oil Palm Development*.—A total of 43,396 oil palm seedlings was distributed this year and the demand far exceeded the supply. As stated in paragraph 147 above, this scheme was completely handed over to the respective District Councils by the end of the year. By that time some 75,000 seedlings had been transplanted out in nurseries for distribution in 1953. Many seedlings planted in the wet season of 1952 were sent out too young, and a fairly heavy mortality resulted. (Seedlings should be at least eighteen to twenty-four inches high when planted out).

153. *Seed Farms*.—Only two seed farms were maintained during the year. One of these, at Fintonia, was completely closed down at the end of the year and the other was partly closed down and modified into a District Council Oil Palm Nursery. Both farms have served their original purpose, the distribution of seed in new areas, and there is no point in maintaining them any longer. The Yele seed farm was closed down early in the year, except for the oil palm nursery section, there being no further need for its continuance.

154. *Mechanical Cultivation*.—The ploughing and harrowing of "boli" land was a new venture during 1952. Some 238 acres were cultivated and the land distributed amongst local farmers, who cropped it with swamp rice. Pa Kema variety gave the best results. Indo-China gave satisfactory results when planted at Bantoro, near Mateboi, but the use of this variety does not appear to be essential under the conditions prevailing there. The local farmers are extremely enthusiastic and the scheme is to be extended in 1953, when it is hoped that a thousand acres may be brought under cultivation.

MUSAIA CIRCLE

155. *Animal Husbandry Station*.—The main building programme was completed during the year, and the water supply worked satisfactorily. Two small dams were constructed across the Kabakea stream to impound water for irrigating small pastures during the dry season. Rice was grown on the flooded area during the rains. Two herds of cattle—a beef and a dairy herd—were continued on the farm; individual records were kept, strict culling and selection were continued and methods of management were studied. The following table shows the growth of the herds:—

Year					Dairy Herd	Beef Herd	Total
1947	..	..	..	..	—	6	6
1948	..	..	..	..	—	57	57
1949	..	..	..	..	53	52	105
1950	..	..	..	..	59	60	119
1951	..	..	..	..	79	77	156
1952	..	..	..	..	139	99	229

156. *Dairy Herd*.—It was possible to purchase twenty-nine heifer calves for drafting into this herd; in addition, nineteen heifer and twelve bull calves were born during the year and five heifers and two bulls were received from other Agricultural stations. There were fifteen deaths, mainly of calves, due in most cases to pneumonia. The main difficulty is that bucket feeding is not satisfactory. The calves do not thrive and are very prone to disease, despite an increase in the quantity of milk fed and in the concentrate ration.

157. The number of animals in the herd at the end of the year was 139. The record is:—

Year	Total Milk Produced	Average Cow Lactation	Total No. of Cows Milked	Average No. of Cows in Milk	Average Length of Lactation	Average Birth Weight
1944	.. 10,136 lb.	390 lb.	26	8	152 days	30.3 lb.
1945	.. 12,356 „	722 „	16	9	203 „	34.1 „
1946	.. 13,955 „	1,077 „	18	8	337 „	35.0 „
1947	.. 15,925 „	1,108 „	18	9	294 „	35.4 „
1948	.. 16,917 „	1,225 „	21	10	285 „	38.1 „
1949	.. 19,202 „	1,381 „	19	10	263 „	39.1 „
1950	.. 17,714 „	1,151 „	18	11	237 „	40.7 „
1951	.. 20,655 „	927 „	21	12	197 „	41.7 „
1952	.. 22,540 „	805 „	28	17	136 „	37.0 „

There is a drop in average yield per cow but this is mainly due to the increasing number of heifers in the herd. There are indications that although an increase in milk yields can be obtained by better management the Ndama is not potentially a good milk animal.

158. Sales of Dairy Products.

		Milk	Butter	Cream	Cheese
1949	..	.. 19,202 lb.	657 $\frac{1}{4}$ lb.	26 $\frac{3}{4}$	36 lb. 11 oz.
1950	..	.. 17,714 „	644 „	51 $\frac{3}{4}$	54
1951	..	.. 20,655 „	674 $\frac{3}{4}$ „	67 $\frac{1}{2}$ pints	61 $\frac{3}{4}$
1952	..	.. 1,644 „	362 „	96	12

The decrease in amounts sold is due to the increase in the quantity of milk fed to calves.

159. *Beef Herd*.—The herd continues to thrive under range conditions. The total head of stock now stands at ninety-nine. Twelve calves were born during the year and one heifer and two bulls exchanged for others of better conformation for beef breeding. The record of the herd is:—

		Total	Average Birth Weight	Live-weight Gain per Head per Month
1949	..	.. 52	26.2	—
1950	..	.. 60	35.1	20 lb.
1951	..	.. 77	35.4	17 „
1952	..	.. 99	30.2	25 „

Although the average birth weight fell, the gain in live-weight per month showed a satisfactory improvement. An attempt is being made to regulate the calving of cows to definite periods of the year, with the aim of improving management of the calves and comparing seasonal variations.

160. All new entrants to the farm were subject to strict quarantine to prevent any outbreak of contagious diseases.

161. *Pigs*.—A small herd of Wessex Saddleback pigs was started with stock from Newton. Three litters of pigs were started during the year, and are doing well. The herd now contains twenty-seven animals.

162. *Poultry*.—The head of stock now stands at 163 Rhode Island Reds. 252 chicks were hatched out in a Hearson incubator received late in the year. There are also sixteen Chinese geese which are satisfactory but not very prolific so far.

163. *Crops*.—Some sixty-three acres of arable crops were grown during the year. These included maize, groundnuts, cowpeas, rice, sweet potatoes, green-gram and cassava. Yields were satisfactory, groundnuts giving 893 lb. of undecorticated nuts per acre.

164. Grasses established as pasture were, on the whole, satisfactory. Both tall and dwarf strains of *Panicum maximum* seem to thrive under swampy conditions, while *Penisetum setosum* does better on more elevated areas. Seven acres of various grasses were ensiled. Twelve acres of *Axonopus compressus* and ten acres of *Panicum maximum* (dwarf strain) were made into hay.

165. Grazing from cultivated grasses was not as plentiful during the dry season as had been hoped. *Axonopus compressus* was the most promising as it continues growing after seeding, and appears to be cheaper to establish and maintain.

166. Germination tests on various grass seeds showed that while germination was good immediately after harvest the viability decreased rapidly during the dry season, until it was almost lost by the beginning of the rains.

167. Small trials with vegetables and onions in a dry season vegetable garden gave very encouraging results.

EXTENSION WORK

168. The small sub-station at Kabala continued to function. The irrigation system was maintained and again good crops of rice were obtained in the dry season,

Variety			Yields in lb. Paddy per Acre		
			1950	1951	1952
No. 79	..	..	1,429	855	2,140
D. 114	..	..	2,591	1,031	1,333

The vegetable garden gave good results and planting material grown for distribution. for which there is a keen demand, included coconuts, oil palm, orange, lime, pine-apples and other economic tree crops.

169. The problem of Fula settlement continued to receive close attention, and a detailed survey of all farms and swamps in Koinadugu District was started, with particular reference to those areas in which Fulas were herding cattle. The preliminary results of this survey have been most useful and a solution to the problem of settling these migrant people appears very near. It is hoped that in 1953 definite constructive action will be possible, with the co-operation of the local paramount chiefs and people.

170. There was a continued interest in ploughing, particularly tractor ploughing although suitable areas for large tractors are neither plentiful nor, at present, accessible. Some thirty acres were ploughed at Fadugu for local farmers. There was considerable interest in ox-ploughing, some thirty ploughs being made available for sale to interested farmers. Five pairs of oxen were trained at the request of the owners and the departmental ox team at Kabala Station did some 285 hours ploughing at a charge of one shilling per hour. Barbed wire was available for sale to farmers and 508 rolls were sold.

171. For the first time the use of sprays and gammatox was demonstrated on herds belonging to local Fula owners and also the worming of calves with phenothiazine. Both these demonstrations were appreciated and much interest was shown.

COLONY CIRCLE

172. *Experimental Station, Newton*.—The policy on Newton farm has remained unchanged. The main objects are stock rearing combined with intensive cultivation of valleys, by means of irrigation. On the upland anti-erosion measures are employed in the establishment of semi-permanent and permanent crops. Mechanical aids have been used wherever possible.

173. *Cattle*.—The herd of Ndama cattle numbered thirty-two at the close of the year. Improvement of the herd had always been kept in mind and to this end the inferior heifer and bull calves are reared for slaughter. The best heifer calves are kept for the replacement of culled animals.

174. *Pigs*.—Wessex Saddleback pigs have not done as well as the Newton strain of Large Whites, and the reason for this is not yet fully understood. It is possible that they have not yet become adapted to local conditions. The remaining pigs have done well. A brief outbreak of Trypanosomiasis was dealt with successfully by Antrycide injections. The stock of pigs at the end of the year was eighty-six head. The number distributed for breeding was sixty-one, and thirty-eight were sold for pork.

175. *Poultry*.—The flock of Rhode Island Red fowls was enlarged and, in consequence, there was a large increase both in egg production and in the number of birds available for sale. The number of eggs sold for hatching was 5,164, and the number of breeding stock sold was 498. The former is roughly double and the latter treble last year's figure.

176. Local Muscovy ducks continued to thrive, but the breeding of imported Khaki Campbell and India Runner ducks was abandoned. Chinese geese, of which twelve were imported in 1950, are now well established and the flock numbers fifty head.

177. *Small Livestock*.—Rabbits and Guinea Pigs were supplied as required to the Veterinary and Medical Departments. There is also quite a large local demand which it was not possible to satisfy.

178. *Crops—Valley Cultivation*.—Intensive cultivation, using farmyard manure and fertilisers, was continued successfully in the east valley. The Model Holding in the west valley again had a successful year.

EXTENSION WORK

179. *Saline Swamp Development*.—Maswari.—A further ninety acres of land was empoldered adjacent to the 75-acre polder. Farmers intending to cultivate the land are clearing the felled mangrove. A total of eighty-one acres of empoldered land was rented to local farmers, who would have taken more had it been available. On the original 4-acre polder, a dressing of two hundred-weight superphosphate, two hundred-weight sulphate of ammonia, and half hundred-weight sulphate of potash per acre, produced a yield of 1,502 lb. of paddy per acre. This year, no fertiliser was applied, and the yield was 728 lb. of paddy per acre. Trials of superphosphate on farmers' plots were successful and gave economic responses.

180. *Wellington*.—Local farmers rented twenty-nine acres out of fifty-eight available and obtained very variable yields. Departmental test plots gave 300, 600 and 720 lb. of paddy per acre. A test plot on an irrigated area gave 1,500 lb. per acre. In view of the poor yields and very high cost of maintaining this polder, it is being abandoned. The cost of maintenance of the sea wall was out of all proportion to the rice yields and it was clear that despite all improvements in technique the experiment could not be applied economically to a larger area.

181. *Mangrove Clearance Loan Scheme*.—Funds provided for the Rural Areas Economic Development Plan have made it possible to begin a Mangrove clearance Loan scheme on the Songo creek. It is estimated that upwards of 100 acres of mangrove have been felled and the land cleared for rice cultivation. Loans of nine pounds each were issued to fifty-five farmers.

Inland Swamp Development:

182. *Campbell Town Swamp*.—A promising freshwater swamp at Campbell Town was surveyed in 1951, and in 1952, twenty-six acres were cleared with funds provided under the Economic Development Plan. The swamp is difficult and somewhat expensive to clear, nevertheless local interest is very keen.

183. *Benguema Swamp*.—This swamp floods deeply and this year Indo-China floating rice was distributed to local farmers, who obtained yields of the order of 1,500 lb. of paddy per acre.

184. *Waterloo Oil Palm Plantation*.—By the end of 1952, a total of 628 acres had been planted. The establishment of transplanted seedlings was poor because funds for maintenance were not forthcoming until late in the year. In consequence, there was a heavy growth of grass which provided shelter for those rodents which attack oil palm seedlings.

185. The cost of the oil palm nursery at Waterloo is met in part from Produce Marketing Board funds. In all, 18,000 seedlings were planted out, 4,500 were used for replacements of failures in previous plantings and 14,500 were distributed to local farmers.

186. *Pigs*.—At the end of the year, there were forty pig-keepers in the Colony area, owning 470 pigs of Newton origin. In 1951 the figures were thirty-six and 320 respectively. The expansion of pig-keeping has continued to be restricted by the shortage of reasonably priced local feeding stuffs. The main ingredient in the diet of local pigs is cassava, usually fed raw. This, by itself, is insufficient to promote rapid and healthy growth. It must be supplemented by food rich in protein. The only reasonably priced food of this nature is rice bran from the Rice Mill at Cline Town, but until the end of the year the supply was inadequate. It is hoped that the position will be considerably improved when an oil-expressing plant is set up for processing groundnuts.

C—HORTICULTURAL SECTION

187. The Horticulturist, Mr. H. D. Tindall, was on leave from 3rd May to 16th November and during his absence this section was supervised by Mr. E. I. Nisbett, Agricultural Officer. Advisory work on the cultivation of fruit and vegetables was continued, and the area covered was extended to include villages on the eastern side of the Colony peninsula, in addition to the mountain villages.

188. *New England*.—This is the headquarters of the Horticultural Section. The area surrounding the office has been terraced and planted with ornamentals for subsequent propagation and a collection of plants of botanical interest has been started. New introductions of seeds and plants have been tried out, and many ornamental and economic plants and seeds have been distributed.

189. Irrigation by overhead spray lines has proved very economical and more efficient than watering by hand. Fertiliser and varietal trials on vegetables provided much useful information.

190. *Lumley*.—The construction of a garden at Lumley was begun in October, 1951, for the purpose of discovering and demonstrating improved methods of vegetable growing in the Colony area, and for propagating fruit trees. A simple irrigation system was installed; water from a well is raised by a semi-rotary pump to an overhead tank, and distributed to all parts of the garden through galvanised iron pipes. This system has been supplemented by power-operated overhead spray lines.

191. It has been found that cultivation to a depth of about ten inches is preferable to shallow cultivation, and that a plentiful supply of compost is essential. The placement of compost eight to ten inches deep has been found preferable to using it as a surface mulch. Fertiliser trials have given interesting results. Sulphate

of potash has been found to increase the yield of onions when applied at the rate of three ounces per square yard, but smaller dressings tend to depress the yield. Cabbage and Cauliflower have responded to superphosphate, and in some places to potash. Sulphate of ammonia alone lowered the yield, but the application of a complete fertiliser dressing was beneficial.

192. Mechanical cultivation with a small rotary cultivator is being investigated on an acre of ground where commercial methods of vegetable growing are being tried out.

193. The propagation of fruit trees, mainly citrus varieties, has been expanded. Part of the nursery has been terraced, and a water supply installed.

194. The erection of a piggery was begun. It is intended that this shall provide manure for the vegetable garden, readily accessible stud boars for pig breeders in the Freetown area, and a demonstration of improved methods in pig rearing. Small piggeries run in conjunction with market gardens could be very profitable in the Freetown area.

195. *Gloucester*.—Fertiliser and variety trials were carried out in the early part of the year, and demonstrations were arranged for interested parties. The beneficial effect of potash on lettuce was confirmed, both as regards size of the plants, and the quality of seed produced.

196. Weekly inspections of local gardeners' crops were carried out by the Agricultural Instructor in charge of the demonstration garden. Spraying to control insect pests was done where necessary, using D.D.T. or gammexane, and in some cases nicotine for caterpillars on cabbage.

197. *Rural Areas Council's Nursery*.—The establishment of a nursery for fruit trees was begun towards the end of the year at Regent. The area was brushed, and contour terracing was begun.

198. *District Work*.—Visits to demonstration gardens have been encouraged. Many local gardeners have taken advantage of practical demonstrations and assistance given not only at demonstration gardens but on their own ground.

199. Samples of fertilisers and seeds have been distributed for those who are interested to try for themselves.

200. A successful Horticultural Show was held at Regent on 21st April. It was opened by His Worship the Mayor of Freetown. There were 250 entries, and exhibits were staged by the Agricultural Officer, Colony, the Horticultural Section, and local schools. A range of horticultural tools were shown by Kingsway Stores.

D—NJALA TRAINING COLLEGE AGRICULTURAL AND AGRICULTURAL EDUCATION COURSES

201. *Agricultural Course*.—There were twenty-seven agricultural students in training, ten in their final year and seventeen in their first year. The first year students were recruited in January, and included one student from the Gambia. One senior student had his scholarship withdrawn in September. Of the first year students four had their scholarships withdrawn in June, two resigned, and one was successful in obtaining a scholarship for higher studies at Fourah Bay College.

202. The lectures and practical work were based on the revised syllabus, the lectures comprising Agriculture, Surveying, Farm Implements and Machinery, Agricultural Chemistry, Animal and Plant Pathology, Zoology, Agricultural Botany, Farm Management, Nursery Practice, English and Arithmetic, with the usual interchange of Education and Agricultural Department staff.

203. Throughout the year the students continued to do a considerable amount of practical work on the College farm. The senior students carried out a chain survey of the farm and drew a scale map. This group also worked at mechanical cultivation on the farm, using a Ransomes M. G. 5 tractor and plough. Other agricultural activities in which the students received training included: pruning, budding and grafting, mulching and manuring of citrus, shading, transplanting of plants, and the growing of vegetables, etc.

204. An interesting fertiliser experiment on Gold Coast Cassava was carried out on the third annual strip by the students. The crop will be harvested and recorded in 1953 by them. Another experiment in upland rice "after bush" was carried out on the farm with the co-operation of the Soil Chemist. This was a very good experiment from a demonstration view-point, and the students showed great interest in it. The rice was harvested later in the year, and the students were thus able to see the experiment right through to its conclusion.

205. There has been some progress in the livestock section. The stock comprised pigs, poultry and rabbits. It is hoped to construct a new piggery and cattle byre in 1953, which will allow a small herd of cattle to be kept and will also allow the management of pigs to be carried on more efficiently. The students are responsible for the rationing and the management of the livestock, and many of them are enthusiastic about this side of their agricultural course. Paddocks have been prepared for the cattle, but all further expansion in the livestock section is delayed until the new buildings are completed. Although egg yields, comparatively, have not been large, the Rhode Island Red stock and the ducks have done well. The pigs have also progressed. All students—Agriculture and Education—have had regular practice in the maintenance of farm buildings, and as a communal effort at the end of the year they erected from local materials a very satisfactory new rabbitry to replace the old one which had been blown down in a tornado. Students also had useful practice in making seed boxes and baskets, hutches and coops, etc., from salvage and bush materials.

206. Nursery practice continued to be an important part of the course, and the system of "student bailiffs" was continued. The new farm store has proved as useful as was expected, and the arrival of special capital equipment from the United Kingdom (as part of the development scheme) has made it possible for really good use to be made of the new laboratory for demonstration, technical and scientific experimental work in all the branches of agriculture studied. Interest and point were added to the regular course from time to time by lectures and instruction from specialist staff of the Agricultural Department stationed in Njala, and from officials visiting the station.

207. A new Allen Auto Scythe was received for the farm towards the end of the year. This implement will be extremely useful for demonstrations during the students' lectures on Farm Machinery and Implements, especially as this section of the students' course is rapidly becoming more and more important. It is also of great value on the farm and compound themselves, and it is hoped to obtain ploughing and drilling attachments. All students are taught to operate it and quickly become skilful in its use.

208. The senior students, accompanied by Mr. E. H. Nichols, proceeded to Rokupr in May, for an intensive course on swamp rice cultivation. They returned in September, and this period is to count as the six months' practical training in the field, which is a part of their course. The senior students will be returning to the College for the first term in 1953 to complete their theoretical courses, after which they will be posted to out-stations as Agricultural Instructors. The complete agricultural course has been reduced from four to three and a-half years.

209. A new cocoa plantation was established during the year, which will be of great value, when the crops are mature, in demonstrating cocoa management to students. Ground has also been cleared for the establishment of coffee plantations, the varieties including Robusta, Stenophylla and Liberica. These will be planted up during the wet season of 1953.

210. Much bush has been cleared, though a great deal remains to be done. Stumping, which is slow and costly, has been suspended; instead, quick brushing followed up regularly by mechanical clearing with the motor scythe is being tried out experimentally, and is expected to give satisfactory results at less cost, the idea being that the stumps will die in time.

211. Class gardens were maintained by all groups during the practical Rural Science periods, and the proceeds were made available to the students' mess, which also received large supplies of fruit and a limited supply of livestock from the College farm. Regular periods were spent by all students in practical compound layout and maintenance work, and greater assistance was given to the Practising School in its garden and sports field, the children in their turn learning "self help" by assuming responsibility for the cleanliness and decoration of the school buildings and compound. On the whole, 1952 has been a year of progress, and plans have been completed for further development in 1953. All Agricultural students have put in a good year's work, and have achieved satisfactory results.

212. *The Agricultural-Education Course.*—The year ended with the following students in residence:—

Second Year Group	..	..	2
First Year Group	..	..	3

All students pursued their specialised courses throughout the year, and made good progress. The two seniors spent the period May to September with the Senior Agricultural Students in field work at the Rice Research Station at Rokupr. Careful attention was paid to professional training on both the education and agricultural sides, and in the lecture room, practising school, field, farm and laboratory. The syllabus, which had been drawn up specially for these students in the previous year, proved most suitable, and continued to be taught in 1952 with few modifications. The second year group were successful in obtaining their Teachers' Elementary Certificate Part I in December, and will complete their training next December, when they will sit for their Teachers' Elementary Certificate Part II and their Agricultural Examinations, and will be equated with holders of the Teachers' Certificate if successful. These senior students will meet a long-felt need when they are trained, and are of excellent quality. Theirs will be an interesting and fruitful career, and they have constantly displayed great energy and enthusiasm. Lectures and practical work were carefully dovetailed within the framework of the education and agricultural courses time-tables, with the addition of special tutorials and lessons where necessary. All students completed a valuable period of block teaching practice at Koyeima and Magburaka Junior Secondary Schools from October to December, where they receive helpful training from the Headmasters (who reported favourably on them) and frequent advisory visits from supervising members of the College Staff. In September the students paid a visit to Koyeima, under the guidance of Mr. G. C. Taylor, where they did valuable work in assisting the Headmaster in his school compound layout, and it is hoped that such duties will figure annually as a practical part of their course.

E—RESEARCH

PLANT PATHOLOGY SECTION

213. The Plant Pathologist reports as follows:—

(1) The Plant Pathologist was absent from Sierra Leone on leave from 5th April to 23rd August. Eight weeks were spent working at the Commonwealth Mycological Institute while on leave.

(2) The phanerogamic herbarium was once more under the Plant Pathologist's supervision, owing to the return of Mr. D. Small to the Forestry Department. The absence of a clerk in any of the Specialist Officers' sections, and even a typewriter, has continued to cause constant inconvenience and delay.

(3) Over 400 collections of fungi were made during the year and sent to the Commonwealth Mycological Institute and Kew Herbarium, duplicates being kept at Njala. Thanks are due to the staff of both these institutions for assistance with identifications. Parts of certain collections were also sent to Dr. F. Petrak in Vienna, who has kindly assisted with the descriptions of a number of new fungus species, chiefly ascomycetes.

(4) About 150 phanerogamic collections were made by the Plant Pathologist's section during the year, and over 400 by other officers, particularly Mr. D. Small, and were sent to Kew Herbarium, duplicates being placed in the herbarium at Njala.

(5) *Maize*.—*Puccinia polysora* was again common, but on local maize varieties only light attacks were recorded: it was more abundant on leaves of maize plants, particularly of exotic varieties, grown on Agricultural stations, but even there the attack was not serious.

(6) *Rice*.—The Principal Agricultural Officer, Scarcies, reports that *Ephelis pallida* (*Balansia* sp.) occurred in 1952 on the following rice varieties at Rokupr: Konko, Hadji Harun, HBJ1, 79/52, D. 52/37, DC. 39/15, No. 79, Sidiankay, Peru 22, D 99, Kav. 12, Indo-China 70 and Toma 280. Most of these varieties were grown on small plots and only one or two panicles in the plot were affected, though the attack was a little more pronounced in the small plots of Toma 280 and DC. 39/15. Kav. 12, D. 99 and Indo-China 70 were grown in larger multiplication plots and infection was noticeable though probably only in the region of half to one per cent of the panicles; as in the most severe attacks reported in 1951.

(7) A new wild host record for Sierra Leone of this fungus was on *Paratheria prostrata* in Samu Chieftdom.

(8) Several new Sierra Leone records of minor fungi were recorded on *Oryza sativa* during the year:

Neottiospora sp. attacking the base of the leaf blade and the leaf sheath below the ligule, common on heavily manured empoldered rice plots at Maswari.

Myrothecium striatisporum Preston, *Phyllosticta miyuræ* Miyake, *Pyrenochaeta oryzae* Shirai, *Dactylaria*, sp., *Periconia minutissima* cda., on glumes.

Sporidesmium bakeri Syd. var. *maydicum* Sacc., *Periconia digitata* (Cke.) Sacc on leaves.

(9) *Rose*.—The *Cercospora* leaf spot mentioned in the Annual Report for 1951 has been identified as *C. puderii* Davis, hitherto apparently only known from the Southern parts of the United States of America.

(10) *Minor new Sierra Leone Records* of fungi include: *Cercospora elaeidis* Steyaert on leaves of oil palm at Makeni Agricultural Station. This fungus is apparently not common in Sierra Leone.

Cephalosporium eichorniae Padwick on leaves of *Coffea robusta* near Kenema. This fungus causes a large zonate leaf spot on a number of wild plants in Sierra Leone and has been recorded on *Calopogonium mucunoides* at Njala.

Cerotelium cochori Syd. on leaves of *Corchorus olitorius* (krin-krin).

Myrothecium roridum Tode ex. Fr. causing a leaf spot of a cacao seedling at Gegbwema.

Nectria ochroleuca (Schw.) Berk. is common, in both perithecial and conidial states, on dead twigs of a number of wild and cultivated plants, and was the apparent cause of a die-back of unthrifty *Berrya ammonilla* trees at Njala.

Calonectria rigidiuscula (Berk. & Br.) Sacc. has also been collected on dead twigs of several different wild and cultivated plants.

One of the commonest ascomycetes on dead twigs of numerous plants in Sierra Leone appeared to be undescribed and has now been described as *Valsaria leonensis* Deight.

(11) *Publications*.—Beitrage zur pilzflora von Sierra Leone, by Petrak and Deighton, Sydowia 6, 1952, pages 309 to 322.

AGRICULTURAL CHEMISTRY SECTION

214. Recruitment of Junior Staff was satisfactory and at the end of the year there were two Laboratory Attendants and two Laboratory Assistants working in the section. Because of this it has been possible to increase the amount of research undertaken. Much time was spent on field work by all members of the section in connection with fertiliser studies and cocoa fermentation experiments.

215. Fertiliser experiments were carried out at many sites throughout the country on the major food and cash crops, in the hope of increasing yields on the naturally poor soils which predominate in Sierra Leone. Several "pot" experiments were performed to study some anomalies found in the field experiments.

216. In the Laboratory, simplified methods of soil analysis were introduced in order to speed up routine work. The use of a colorimeter, in particular, has resulted in a great saving of time.

217. *Fertiliser Experiments:*

(1) *Swamp Rice*.—Four major experiments and a large number of simple trials were performed in swamps in all parts of the country. At all sites there was a marked response to superphosphate. Using 2 cwt. per acre of the fertiliser the main yield increase was 48 per cent and a mean extra profit was obtained of £10 2s. 0d. per acre, at present prices. 2 cwt. per acre of superphosphate was used at most sites and there are indications that this is the optimum dressing. In a few trials the fertiliser was applied at varying times but the results were erratic and further work is necessary to determine the best time of application. Other fertilisers gave little response. Sulphate of Ammonia when applied at planting time gave yield increases at three sites only: Mapotolon, Mateboi and Musaia. The soil of the swamp treated at Musaia is known to be very fertile and probably has a high content of nutrients, although no analysis figures are available to confirm this. The swamp receives erosion debris from several square miles of deforested upland, and the rice yields without fertiliser were very high. At Mateboi, sulphate of ammonia only gave an increase in yield with a 1 cwt. per acre dressing in the presence of 2 cwt. of superphosphate. This was a very significant result, but as it is unusual more work will be necessary to verify it. Sulphate of Potash and Lime had no positive effect on the rice yield. Preliminary recommendations have been made that, wherever possible, swamp rice should have a dressing of 1½ cwt. of superphosphate per acre.

(2) *Upland Rice*.—No marked response to fertilisers has been found on this crop. At Njala a slight increase in yield was observed with 2 cwt. per acre of superphosphate, whilst at Teko there was a small but significant response to sulphate of ammonia and sulphate of potash. Lime, in general, depressed the yield. At three other sites, no response was obtained.

(3) *Cassava*.—In all four experiments and in nine of the thirteen trials, marked responses were found with superphosphate and sulphate of potash; both singly and in combination. In four trials in the Magburaka area, the responses obtained were not significant. Where a response was obtained the mean increases in yield were:—

2 cwt. per acre Superphosphate	..	..	..	32%
2 cwt. per acre Sulphate of Potash	..	..	..	41%
A combination of the above dressings	..	..	..	59%

These increases are considerable but it is difficult to give profit figures. Cassava is grown for home consumption by the farmers' family, and, when it is sold, the market price is very variable. The actual increases in yield from the combined fertiliser dressing are in the region of 1,500 lb. of roots per acre over a yield of 3,500 lb. without fertiliser. Sulphate of Ammonia depressed the yield at all sites while Lime had no effect.

(4) *Groundnuts*.—Superphosphate was, again, the only fertiliser which had any effect in increasing yields. In only one experiment out of a total of three experiments and six trials was no response obtained. Excluding this experiment the mean increase in yield due to 2 cwt. per acre of superphosphate was sixty per cent, with an increase in profit of £7 10s. 0d. per acre. More work is necessary to find the optimum dressing and the best time of application. No response was obtained from any fertilisers at a site near Port Loko. The experiments there are discussed in paragraph 218 below. Neither lime nor gypsum had any effect on the final yields, which is contrary to evidence from other parts of West Africa. Gypsum did, however, improve the germination percentage.

(5) *Ginger*.—Five trials were carried out in the Moyamba-Sembahun area. Remarkable increases in yield were found after the application of sulphate of potash and slightly more when superphosphate was applied in addition. The increase in yield from the single fertiliser was sixty-five per cent on a mean yield (unfertilised) of 2,300 lb. per acre. Owing to the wide annual variation in the market price of ginger it is difficult to work out the probable profit but, if the cost of Sulphate of Potash remains in the region of £29 per ton, application of 2 cwt. per acre of the fertiliser will be profitable when the price of ginger is greater than $\frac{1}{2}$ d. per lb.

(6) *Cocoa*.—In 1951 a large trial was started in the Tonkia Chieftdom at Gegbema. After fertiliser applications in that year, increases in yield were found on any plot that had superphosphate. In 1952, however, plots which had superphosphate alone gave a yield no greater than the controls. Plots which had both superphosphate and Sulphate of Potash were much higher yielding than the rest. It seems probable that the large yields in 1951 with superphosphate alone caused a depletion of the potassium reserves in the soil which had to be made up in the second year. The trial is continuing.

(7) *Oil Palms*.—At a trial in the Masanki Plantation, sulphate of potash caused an increase in head weight in the first and second years of application.

(8) *Musaia Cow Peas and Waterloo Beans*.—(Varieties of *Vigna sinensis*). In the two trials, superphosphate, but no other fertiliser, increased the yield of pods. This increase was in the region of 130 per cent. It is doubtful if this is profitable as a general rule, although the increased yield is important on Departmental Farms, where the beans are valuable as protein concentrates for livestock.

(9) *Grassland*.—One simple experiment was carried out at Njala on Dwarf Guinea grass. The two fertiliser treatments were (a) 2 cwt. each of Sulphate of Ammonia, superphosphate and Sulphate of Potash per acre and (b) mixed fertilisers as in (a) but with the addition of $4\frac{1}{2}$ cwt. per acre of Hydrated Lime. The Lime had no effect. The increase in yield due to the fertilisers was seventy per cent more than the control plots. The grass was cut in the young stage before flower heads were formed. The application of fertilisers had no effect on the yields in the dry season, when water is the major limiting factor.

218. *Groundnut Experiment at Port Loko*.—This was the experiment where increases in yield were not found after fertiliser application. See paragraph 217 (4). The major experiment at the site was a 2x2x2 factorial, testing the effect of:

- (a) 2 cwt. per acre Superphosphate;
- (b) 2 cwt. per acre Gypsum;
- (c) 2 cwt. per acre Hydrated Lime.

Also there was another trial, to test the effects of various levels of these fertilisers, including Sulphate of Ammonia and Sulphate of Potash in all combinations. Unfortunately, part of the experimental site had been cleared in 1951 and part in 1952, but this was not discovered until after planting. The area which had been cleared in 1951 had carried one crop of groundnuts and had given a yield of about 1,000 lb. nuts

in shell per acre. When the experiment was harvested it was found that a similar yield was obtained on the land cleared in 1952 but on that part cleared in 1951 the yield had dropped to about 350 lb. per acre. Owing to the layout it was possible to decide that none of the fertilisers used in the experiments improved the yield in the second year of growth. A careful study of the experimental conditions showed that the reduction in yield might be caused by a lack of one of the "trace" elements, as all other major factors influencing growth were similar in both years. In a series of "Pot" tests on the soil it was found that Manganese, Magnesium, and possibly Copper and Zinc, increased groundnut yields. The deficiency of these elements is to be expected. The site has a rainfall in the region of 100 inches *per annum* and the soil is strongly leached. It is probable that the Grass and Lophira vegetation accumulated these elements in their tissues over a period of years. They were available to the first crop after burning the natural vegetation, but the leaching in that year removed the remainder beyond the root range of groundnuts. A considerable volume of work is necessary to confirm these conclusions, but if they are correct it is probable that addition of trace elements may improve crop yields on other infertile uplands in this country.

219. *Cocoa Fermentation*.—A series of experiments were carried out at a Departmental Fermentary at Futa, in the Peje Chieftdom. A considerable quantity of cocoa produced in the past has been of poor quality. The fault appears to lie in the methods used in fermenting and drying the cocoa beans. About two tons of wet cocoa were fermented experimentally and the following conclusions were drawn from the experimental results:—

- (1) It is very difficult to get high grade cocoa by fermentation of the mid-season crop. At this time the rains are still heavy and the fermenting cocoa does not heat up. Drying is also protracted.
- (2) Although the purple bean percentage is reduced by fermenting cocoa in unlined baskets, mould increases considerably and this procedure is not recommended. Baskets should be lined with banana or plantain leaves.
- (3) The fermenting cocoa should be well stirred every two days.
- (4) Fermentation should be for seven days at the beginning of the season and six days at the end.
- (5) Slow drying of the fermented cocoa is essential. The cocoa should be dried under cover for at least two days before it is put into the sun.

(6) The percentage of purple beans becomes less as the dry cocoa is stored. The grading of cocoa has been very strict and any bean with the slightest trace of purple colour has been regarded as under-fermented. Following on conclusion (6) above it would seem desirable to change the grading standards to allow slightly purple beans to be classed as fully fermented, as these beans will certainly turn brown during storage. The possession of a good "break" would be a better criterion of complete fermentation.

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